Mathematics 2002
Performance Definitions

Grade 4

Basic Level

Students who scored at the "Basic" level demonstrated minimal evidence of their understanding of the grade-level appropriate mathematics content in the <u>Michigan Curriculum Framework</u>. Such evidence was exhibited by, but was not limited to, students:

Applying basic concepts, algorithms, properties, and procedures to solve simple, one-step problems presented in a real-world context.

- some number sense (not complete)
- doesn't have basic facts memorized (have most +, −, still working toward × and ÷)
- read and interpret and apply simple one-step problems
- can identify which operation strategy to use for a one-step problem
- know basic shapes, but not all important attributes
- limited sense of equivalence

Using appropriate tools (such as tables, charts, graphs, compasses, protractors, and/or formulas) to obtain mathematical information.

- can find information and answer a simple question
- knows how to use tools; may lack fine motor skills

Generating minimal written responses to questions.
- can write a partial explanation using at least one function of the problem; may not have accurate answer
- skips portions of written responses; incomplete ideas or incorrect concepts expressed
- lacks or minimal mathematical vocabulary

Recognizing examples and applications of mathematical ideas.
- lacks conceptual understanding — rote learner
- doesn't question examples
- recognizes obvious math info, difficulty with multi-step

Met Level

Students who scored at the "Met" level consistently applied grade-level appropriate, integrated procedural knowledge and conceptual understanding to solve problems consistent with the mathematics content in the <u>Michigan Curriculum Framework</u>. Such evidence was exhibited by, but was not limited to, students:

Applying basic concepts, algorithms, properties, and procedures to solve multi-step, routine problems.

- basic computation, procedures, properties, etc.,
- adequate number sense (can skip count, county forward, backward)
- understands inverse operations $(+, -)$ $(\times, \div)$
- has most facts memorized and strategies for those unknown
- understands equivalence
- can perform two-step problem with difficult operations, but still routine
- knows basic shapes and important attributes
- has problem solving strategies and accuracy

Using appropriate tools (such as tables, charts, graphs, compasses, protractors, and/or formulas) to obtain and interpret mathematical information.

- proficient with using tools (can also construct)
- performs special tasks with accuracy and understanding on calculators
- can apply, recognize, and interpret
- read and construct graphs and tables

Generating adequate written explanations that show solutions with supporting information.

- can explain how they got the answer — might have a minor flaw
- can explain more than one step solution
- supports solution; demonstrates conceptual understanding
- can write an explanation and show processes used to solve problems

Generating examples and counterexamples of mathematical ideas.

- can write own problems (one-step)
- able to analyze — includes limited counting examples
- analyze mathematical info to make a connection inside mathematics

Exceeds Level

Students who scored at the "Exceeds" level demonstrated the grade-level appropriate ability to apply integrated procedural knowledge and conceptual understanding to complex and non-routine real-world problems that reflect the mathematical content in the <u>Michigan Curriculum Framework</u>. Such evidence was exhibited by, but was not limited to, students:

Applying concepts, algorithms, properties, and procedures to solve multi-step, non-routine problems.

- applies, transfers, integrates math concepts and prior knowledge to solve multi-step non-routine problems
- excellent mathematical vocabulary
- understands equivalence and relationships
- innovative — many solutions to problem solving — can apply to new situations
- concepts trigger internal visuals
- solve complex or multi-step problems in a variety of ways, then choosing the most efficient way to the correct response

Using appropriate tools (such as tables, charts, graphs, compasses, protractors, and/or formulas) to obtain, interpret and apply mathematical information to complex situations.

- applies and interprets math info to complex situations
- uses tools to enhance thinking (+ appropriate time)
- knows what graph, chart is telling without prompt

Generating and justifying conclusions by providing accurate, concisely written responses to mathematical questions.

- correct solution with clear explanation/support
- extends, generates beyond the obvious
- explains completely with mathematical vocabulary, including symbols
- can write an explanation to justify their strategies using accurate math terminology to solve problems

Generalizing from examples, extending examples, and generating counter examples.

- can produce own examples and counterexamples
- can create many types of problems
- able to synthesize (includes creative examples) and transfer mathematical concepts inside and outside of math